

Remarks

Entry of the amendments, reconsideration of the application in view of the following remarks, and allowance of all pending claims are respectfully requested. Claims 7 and 8 are added hereinabove, and claim 6 is canceled without prejudice. Therefore, claims 1-5, 7, and 8 remain pending in this application.

Claims 1-5 have been amended to more particularly point out and distinctly claim certain features of Applicants' invention. For example, the preambles of claims 1-5 are similarly amended hereinabove to clarify the general technical environment of the claimed invention. Also, claims 1 and 4 are amended to clarify that the two opposed surfaces of the elongated bar are heating surfaces. Support for this amendment to claims 1 and 4 can be found on page 6, lines 7-14 of the specification, for example. In addition, claims 1 and 4 are also amended to clarify that the one of the two opposed heating surfaces of the elongated bar is configured for contacting the gate of a wax pattern, while the other of the two opposed heating surfaces of the elongated bar is configured for contacting a wax runner. Examples that illustrate configurations of the heating surfaces for contacting the gate of a wax pattern and for contracting a wax runner can be found throughout the specification. For instance, see FIGS. 1-9, page 6, line 12 to page 7, line 14, and page 7, line 20 to page 8, line 2 of the specification.

Support for new claim 8, reciting a method of heating wax on a surface of a wax runner and wax on a surface of a pattern gate using a wax tree assembly knife, is provided in page 6, lines 2-11 and FIGS. 1-4 of the specification, for example. The subject matter of canceled claim 6 is rewritten in dependent form in new claim 7. The amendments to the claims hereinabove are not meant to indicate Applicants' acquiescence to the substance of the outstanding Office Action. No new matter is added to the application by any amendment presented.

Objection to Specification

In the Office Action dated December 6, 2004, the specification was objected to as having a typographic error on page 2, line 3. The typographic error in the serial number of the referenced patent application of Ludwig et al. is corrected in the Amendments to the Specification hereinabove as required in the Office Action to overcome the objection.

35 U.S.C. §102(b) Rejection over Ammann

In the Office Action, claims 1, 4, and 6 were rejected under 35 U.S.C. §102(b) as being unpatentable over Ammann (U.S. Patent No. 4,081,658). Applicants respectfully traverse this rejection because the cited patent does not teach or suggest all of the elements of Applicants' claimed invention and, therefore, does not anticipate Applicants' claimed invention as explained below.

Applicants' present invention addresses the problem of lost product in a lost wax process for casting due to excess melted wax running over the side of a wax runner during the assembly of a wax tree (page 2, line 13 to page 3, line 2 of the specification). In accordance with the present invention as recited in claim 1, a wax tree assembly knife comprises the following structures: "an elongated bar of heat conducting material having two opposed and generally parallel heating surfaces ..."; and "means for heating the elongated bar." One of the opposed heating surfaces of the elongated bar is configured for contacting the gate of a wax pattern, which is to be fused to a wax runner. The other of the opposed heating surfaces of the elongated bar is configured for contacting the wax runner. Claim 1 further recites that the heating surface configured for contacting the wax runner has "two side edges and a center section between the two side edges, at least a portion of the center section being slightly closer to the heating surface configured for contacting the wax runner than the side edges and configured to provide a space for molten wax to be retained." In other words, each of the two opposed and generally parallel heating surfaces of elongated bar is configured to contact a distinct work piece.

In contrast, Ammann is directed a different problem, and consequently the structures in Ammann are different from the claimed invention. Ammann describes an apparatus for batch soldering a number of electrical connections between cables or between a cable and a connector. Applicants respectfully submit that Ammann does not teach or suggest all of the elements of Applicants' claimed invention because it does not teach or suggest an elongated bar having two heating surfaces. Although FIG. 1 of Ammann illustrates conductive bars 101 and 102, Ammann does not teach or suggest "an elongated bar ... having two opposed and generally parallel heating surfaces" because neither is a heating member. Rather, conductive bars 101 and 102 are configured to supply electrical current to heating member 106 (col. 3, lines 9-20 of Ammann). In fact, Ammann explicitly states that the heating effect in bars 101 and 102 is insignificant due to their high electrical conductivities (col. 3, lines 20-22). Similarly, Ammann states that the elongated bars 301 and 302 of FIG. 3 are not heated responsive to the flow of electrical current (col. 4, lines 31-35). Moreover, heating member 106 in Ammann is not an elongated bar as recited in claim 1. Ammann describes heating member 106 as a U-shaped metal strip (col. 3, lines 13-20, lines 22-26, and lines 34-39, for example). Applicants respectfully submit that a U-shaped metal strip is not an elongated bar. Indeed, Ammann itself distinguishes a metal strip from an elongated bar (col. 2, lines 65-68; metal strip 106, conductive bar 101, and conductive bar 102 of FIG. 1; and col. 3, lines 13-22). Therefore, Applicants respectfully submit that Ammann does not teach or suggest a "an elongated bar ... having two opposed and generally parallel heating surfaces."

Even assuming arguendo that a thin strip of metal can be construed as an elongated bar, Ammann's heating member 106 does not have two heating surfaces that are configured to contact two respective work pieces. Instead, heating member 106 is described throughout Ammann as being configured so that one surface (the lower surface) of heating member 106 contacts both work pieces to be soldered (col. 3, lines 34-36, FIGS. 2 and 3, and col. 4, lines 9-16). Therefore, Applicants respectfully submit that Ammann does not teach or suggest all of the elements of Applicants' invention, as recited in claim 1, because Ammann does not teach or suggest "two opposed and generally parallel heating surfaces, one of the heating surfaces configured for contacting a pattern gate and another of the heating surfaces configured for

contacting a wax runner.” Accordingly, Applicants respectfully submit that claim 1 is not anticipated by Ammann, and withdrawal of the rejection based thereon is respectfully requested.

Applicants respectfully submit that claim 4 is patentable over Ammann for the reasons stated above with respect to claim 1 because claim 4 also recites “an elongated bar of heat-conducting material having two opposed and generally parallel heating surfaces, one of the heating surfaces configured for contacting a pattern gate and another of the heating surfaces configured for contacting a wax runner.” Therefore, withdrawal of the rejection of claim 4 based on Ammann is also respectfully requested.

Applicants also respectfully submit that new claim 7, which includes the subject matter of canceled claim 6, is patentable for the same reasons as claim 4 because claim 7 depends from claim 4.

35 U.S.C. §102(b) Rejection over Tucker et al.

In the Office Action, claims 1, 3, 4, and 5 were rejected under 35 U.S.C. §102(b) as being unpatentable over Tucker et al. (U.S. Patent No. 6,039,241; hereinafter, “Tucker”). Applicants respectfully traverse this rejection because the cited patent does not teach or suggest all of the elements of Applicants’ claimed invention and, therefore, does not anticipate Applicants’ claimed invention as explained below.

As discussed above, Applicants’ present invention addresses the problem of lost product in a lost wax process for casting due to excess melted wax running over the side of a wax runner during the assembly of a wax tree (page 2, line 13 to page 3, line 2 of the specification). As recited in claim 1, a wax tree assembly knife comprises “an elongated bar of heat conducting material having two opposed and generally parallel heating surfaces.” One of the opposed heating surfaces of the elongated bar is configured for contacting a wax runner. Claim 1 further recites that the heating surface configured for contacting the wax runner has “two side edges and a center section between the two side edges, at least a portion of the center section being slightly

closer to the heating surface configured for contacting the wax runner than the side edges and configured to provide a space for molten wax to be retained.”

In contrast, the structure described in Tucker is directed to a mechanism, which plugs into surface mount connectors for integrated circuit chips, for reflowing solder connecting a surface mount connector to a circuit board so that the surface mount connector can be removed from the circuit board (col. 1, lines 6-10; col. 2, 35-38; and col. 2, lines 40-51). The structure in Tucker is configured so that it couples to the connector as if the structure were a chip device (col. 2, lines 49-51) and conducts heat through the leads of the connector to the solder joints (col. 2, lines 41-45). That is, the structure’s heating components (fins 15 in FIGS. 1, 2A, 2B, and 3 of Tucker) couple to the connector like the pins of a chip device (col. 2, lines 51-52). As a consequence, fins 15 in Tucker are configured to mimic the pins of a chip device; thus, fins 15 are not configured to contact a wax runner. Instead, fins 15, which are construed as a central area of a surface in the Office Action, are configured to contact the leads of a connector, not a wax runner. In Tucker, the surface having fin 15 in its center area is configured to heat a contact of a surface mount connector, and it is the contact which transfers heat to a solder joint. The slots between fins 15 comprising the center area in Tucker are dimensioned and located so that fins 15 mate with a particular electrical connector. Thus, Tucker’s surface having fin 15 in its center area is not configured to contact a member, such as a wax runner, having a surface that becomes molten in the vicinity of contact. Because Tucker’s device is not configured to contact a surface that becomes molten, the surface having fin 15 in its center area need not be configured and is not configured to “provide a space for molten wax to be retained” as explained further below.

As illustrated (FIGS. 1, 2A, and 2B) and described in Tucker, fin 15 is a thin structure for heat transfer because the fin mates with an integrated circuit connector like the pin of an integrated circuit chip. Therefore, Tucker’s fins with slots between them are not configured to for contacting a flat or cylindrical wax runner because they are configured to contact the generally V-shaped contacts of a surface mount connector. Moreover, in the Office Action, fin 15 is considered to be a central area having a plurality of slots, and the slots between the fins are considered be grooves in the heating surface. However, even this interpretation of Tucker fails

to teach or suggest a heating surface that is configured to contact a wax runner and to provide a space for molten wax to be retained. The slot between fins in Tucker cannot retain wax because it is an opening or hole in the heating surface, rather than a recessed area of the heating surface. The difference is that a recessed area of a surface is configured to retain molten wax because the volume defined by the recessed area has only one open side, which is located in the plane of the portion of center section that is closer to the wax runner (i.e., the portion of the center that contacts the wax runner). In contrast, the slot illustrated in Tucker defines a volume with three open sides (front, back, and bottom). This volume defined by the slot in Tucker is necessarily very thin from front to back because the fins are configured to fit into an integrated circuit connector. Therefore, Applicants respectfully submit that structure in Tucker is not configured to provide a space for molten wax to be retained because it is clearly not capable of retaining molten wax. Tucker is also different from an alternative embodiment of the claimed invention, wherein the recessed area runs the entire length of the heating surface, because the cross-sectional areas of the grooves perpendicular to the plane of the heating surface (i.e., the areas of the openings on the sides of the elongated bar) are significantly smaller than the cross-sectional areas of the grooves parallel to the heating surface. Thus, the molten wax is also largely retained in the alternative embodiment, in contrast to Tucker.

Applicants respectfully submit that claim 4 is patentable over Tucker for the reasons stated above with respect to claim 1 by analogy because claim 4 essentially recites another embodiment of the invention. Namely, claim 4 recites an elongated bar having a surface configured for contacting a wax runner wherein the surface has at least one raised area, and the surface for contacting the wax runner is also configured to provide a space for molten wax to be retained. Applicants also respectfully submit that claims 3 and 5 are patentable over Tucker for the reasons stated above because claims 3 and 5 depend from claims independent claims 1 and 4, respectively. Moreover, Applicants respectfully submit that claims 3 and 5 are patentable over Tucker for their recitations of further aspects of the invention as well. Therefore, withdrawal of the rejection of claims 1 and 3-5 based on Tucker is also respectfully requested.

35 U.S.C. §103(a) Rejection over Tucker

Claim 2 was rejected under 35 U.S.C. §103(a) as being unpatentable over Tucker in the Office Action. Applicants respectfully traverse this rejection because the cited patent does not teach or suggest all of the elements of Applicants' claimed invention and, therefore, does not render Applicants' claimed invention obvious as explained below.

Applicants respectfully submit that claim 2 is patentable over Tucker for the reasons stated above with respect to claim 1 because claim 2 depends from claim 1 and because claim 2 also further characterizes the invention. For example, Tucker does not teach or even suggest "an elongated bar ... having two opposed and generally parallel heating surfaces" wherein one of the heating surfaces configured to provide a space for molten wax to be retained as explained above with respect to claim 1. In addition, because Tucker does not teach or suggest a heating surface configured to provide space for molten wax to be retained, Applicants respectfully submit that configuring the center area of a surface of an elongated bar to be concave would not be obvious to one of ordinary skill in the art. Therefore, withdrawal of the rejection of claim 2 based on Tucker is also respectfully requested, and allowance of claim 2 is respectfully solicited.

35 U.S.C. §103(a) Rejection over Tucker et al. and Ammann

In addition, claim 6 was rejected under 35 U.S.C. §103(a) as being unpatentable over Tucker in view of Ammann in the Office Action. Since independent claim 6 is canceled hereinabove and since the recitations of canceled claim 6 are rewritten in dependent form in new claim 7, the following arguments are directed to the patentability of new claim 7 over the combination of Tucker and Ammann proposed in the Office Action. Applicants respectfully submit that the cited combination of patents does not teach or suggest all of the elements of Applicants' claimed invention as recited in claim 7 and, therefore, does not render Applicants' claimed invention obvious as explained below.

Since claim 7 depends from claim 4, Applicants respectfully submit that, with respect to claim 7, Tucker fails to teach or suggest an elongated bar having a surface configured for contacting a wax runner, wherein the surface has at least one raised area and is configured to provide a space for molten wax to be retained, for the reasons stated above with respect to claim 4. The Office Action does not cite Ammann as teaching or suggesting this element for the proposed combination, and Ammann does not cure the deficiency of Tucker, as explained above with respect to the rejection of claim 4 under 35 U.S.C. §102(b) over Ammann. Therefore, allowance of claim 7 is respectfully solicited.

New Claim 8

Applicants respectfully submit that neither Amman nor Tucker teach or suggest a method of heating wax on a surface of a wax runner and wax on a surface of a pattern gate using a wax tree assembly knife in preparation for fusing the pattern gate of a wax pattern to the wax runner, as recited in new claim 8. In contrast, Amman is directed to concurrently soldering a plurality of corresponding conductors on two workpieces, while Tucker is directed to the removal of surface mount connectors from circuit boards. Neither Amman nor Tucker teaches or suggests the following aspect of the claimed invention:

providing an elongated bar of heat conducting material having two opposed and generally parallel heating surfaces, one of the heating surfaces configured for contacting a pattern gate and another of the heating surfaces configured for contacting a wax runner, the heating surface configured for contacting the wax runner having two side edges and a center section between the two side edges, at least a portion of the center section being slightly closer to the heating surface configured for contacting the wax runner than the side edges and configured to provide a space for molten wax to be retained.

Also, neither patent teaches or suggests “temporarily positioning the elongated bar between the pattern gate and the wax runner.” Therefore, allowance of claim 8 is respectfully solicited.

For the reasons discussed above, Applicants respectfully submit that claims 1-5, 7, and 8 recite patentable subject matter over the applied art. Withdrawal of the rejections of claims 1-5

and the subject matter of new claim 7 is respectfully requested, and allowance of all pending claims is respectfully solicited.

Should the Examiner wish to discuss this case with Applicants' attorney, please contact Applicants' attorney at the phone number listed below.

Respectfully submitted,

A handwritten signature in cursive script, reading "Stephen M. Hladik". The signature is written in dark ink and is positioned above a horizontal line.

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